DRINKING WATER SURVEILLANCE PROGRAM

HARROW - COLCHESTER WATER SUPPLY SYSTEM

ANNUAL REPORT 1990

Ontario Environment Environnement

ISSN 0840-5239

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JULY 1992

Cette publication technique
n'est disponible qu'en anglais.

PIBS 2009
Log 92-2302-237

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

HARROW-COLCHESTER WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Harrow-Colchester water supply system is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, taste and odour control and disinfection. This plant has a designed capacity of 10.2 x 1000 m^3/day. The Harrow-Colchester water supply system serves a population of approximately 5,200.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Harrow-Colchester water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

	SCAN	SITE RAW INTAKE TESTS	POSITIVE	%POSITIVE	TREATED TESTS	POSITIVE	%POSITIVE	SITE 1 TESTS	POSITIVE	%POSITIVE	SITE2 TESTS	POSITIVE	%POSITIVE
	BACTERIOLOGICAL	12	11	91	6	0	0	7	0	0	7	0	0
	CHEMISTRY (FLD)	18	18	100	36	36	100	78	78	100	65	65	100
	CHEMISTRY (LAB)	132	111	84	152	111	73	245	205	83	235	194	82
	METALS	144	59	40	168	53	31	299	111	37	299	103	34
	CHLOROAROMATICS	84	0	0	98	0	0	84	0	0	84	0	0
	CHLOROPHENOLS	6	0	0	12	0	0	.	.	.	.	.	.
	PAH	102	0	0	119	0	0	34	0	0	34	0	0
	PESTICIDES & PCB	205	0	0	239	0	0	128	0	0	128	0	0
	PHENOLICS	6	1	16	7	1	14	.	.	.	.	.	.
	SPECIFIC PESTICIDES	32	0	0	57	0	0	6	0	0	6	0	0
	VOLATILES	174	0	0	203	28	13	203	28	13	203	28	13
TOTAL		915	200		1097	229		1084	422		1061	390	

DRINKING WATER SURVEILLANCE PROGRAM

HARROW-COLCHESTER WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Harrow-Colchester water treatment plant in the spring of 1985 as part of a pesticide study conducted in the southwestern region. Previous DWSP annual reports have been published for 1986, 1987, 1988 and 1989.

PLANT DESCRIPTION

The Harrow-Colchester water supply system is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration, taste and odour control and disinfection. This plant has a designed capacity of 10.2 x 1000 m^3/day. The Harrow-Colchester water supply system serves a population of approximately 5,200.

The sample day flows ranged from 1.5 x 1000 m^3/day to 3.3 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the

plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of

the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 13 of 20 treated and distributed water samples with a maximum reported value of 22.°C.

CHEMISTRY (LAB)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 20 of 20 treated and distributed water samples with a maximum reported value of 150.8 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 1 of 21 treated and distributed water samples with a maximum reported value of 110.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected in the treated or distributed water.

PESTICIDES & PCB

The results of the pesticides & PCB scan showed that none were detected.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results were detected above trace levels.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 21 treated and distributed water samples analyzed with a maximum level of 36.3 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Harrow-Colchester water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

HARROW - COLCHESTER SOUTH WTP

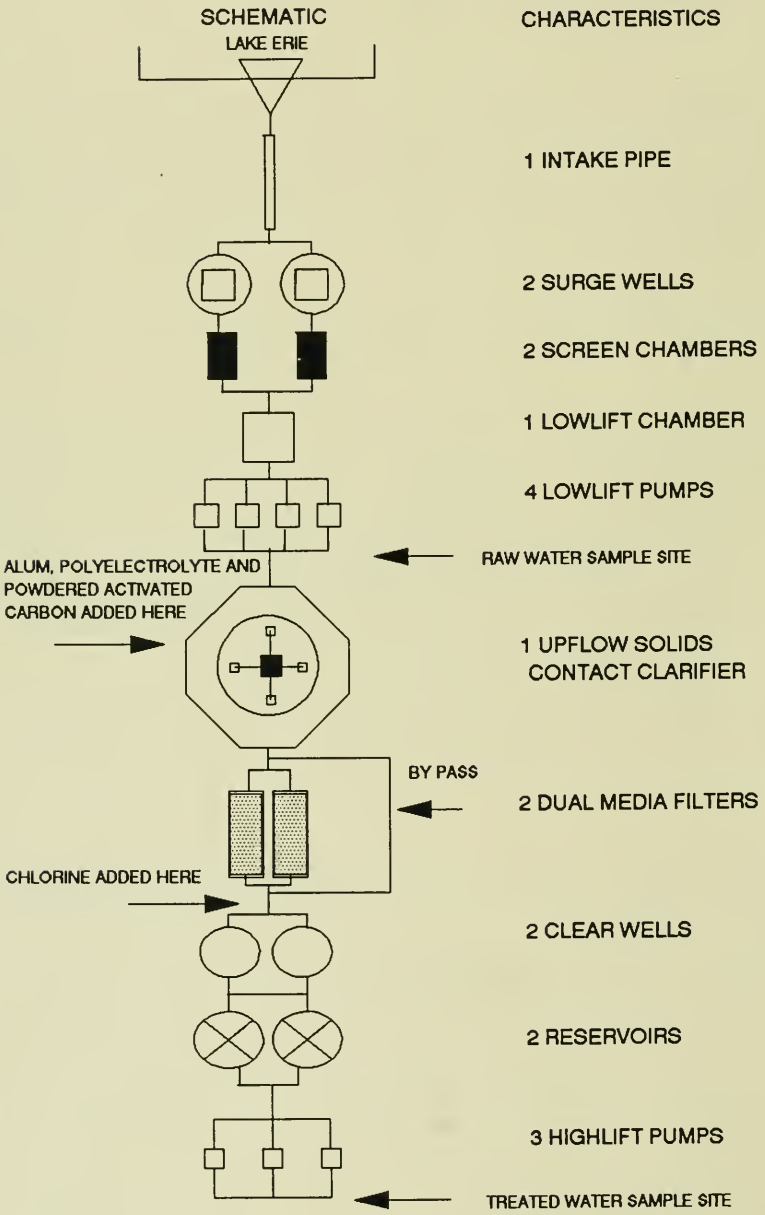

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 210000130
PLANT NAME: HARROW-COLCHESTER SOUTH WSS

DISTRICT: WINDSOR
REGION: SOUTHWEST
DISTRICT OFFICER :J. DRUMMOND

UTM #: 173567004654000

PLANT SUPERINTENDENT: DON MARONTATE

ADDRESS: P.O. BOX 909
HARROW, ONTARIO
N0R 1G0
(519 738 3038)
FAX 519-738-3993

MUNICIPALITY: HARROW-COLCHESTER SOUTH
AUTHORITY: PROVINCIAL

PLANT INFORMATION

PLANT VOLUME:	3.099	(X 1000 M3)
DESIGN CAPACITY:	10.229	(X 1000 M3/DAY)
RATED CAPACITY:	-	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
COLCHESTER SOUTH	2,717
HARROW	2,510

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
FREE CHLORINE RESIDUAL	TREATED WATER	DAILY READING
TOTAL CHLORINE RESIDUAL	TREATED WATER	DAILY READING
PH	RAW WATER	DAILY READING
	TREATED WATER	DAILY READING
TEMPERATURE	RAW WATER	DAILY READING
	TREATED WATER	DAILY READING
TURBIDITY	RAW WATER	DAILY READING
	CLARIFIED WATER	DAILY READING
	FILTERED WATER	DAILY READING
	TREATED WATER	DAILY READING

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGES (MG/L)			
			COAGULATION	COAGULATION AID	TASTE & ODOUR	POST CHLORINATION
			ALUM LIQUID	POLYELECTROLYTE	ACTIVATED CARBON POWDER	CHLORINE
DATE	DELAY * TIME(HRS)	FLOW (1000M3)				
JUN 27	7.50	3.360	25.00	.10	3.00	.59
JUL 24	21.05	2.273	20.00	.10	3.00	.72
AUG 27	20.00	2.450	20.00	.10	5.00	.61
SEP 25	27.15	1.893	20.00	.10	5.00	.62
OCT 23	28.05	1.826	20.00	.10	5.00	.54
NOV 27	25.00	1.591	20.00	.10	5.00	.60
DEC 18	24.00	1.500	25.00	.10	5.00	.55

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW INTAKE			TREATED			SITE 1			SITE2		
	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	
BACTERIOLOGICAL												
FECAL COLIFORM MF	4	4	0	.	.	.	.	.	.	.	.	
STANDRD PLATE CNT MF	.	.	.	6	0	0	7	0	0	7	0	0
TOTAL COLIFORM MF	4	3	0	.	.	.	.	.	.	.	.	
T COLIFORM BCKGRD MF	4	4	0	.	.	.	.	.	.	.	.	
*TOTAL GROUP BACTERIOLOGICAL	12	11	0	6	0	0	7	0	0	7	0	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	.	.	.	6	6	0	13	13	0	13	13	0
FLD CHLORINE FREE	.	.	.	6	6	0	13	13	0	13	13	0
FLD CHLORINE (TOTAL)	.	.	.	6	6	0	13	13	0	13	13	0
FLD PH	6	6	0	6	6	0	13	13	0	13	13	0
FLD TEMPERATURE	6	6	0	6	6	0	13	13	0	13	13	0
FLD TURBIDITY	6	6	0	6	6	0	13	13	0	.	.	.
*TOTAL SCAN CHEMISTRY (FLD)	18	18	0	36	36	0	78	78	0	65	65	0
CHEMISTRY (LAB)												
ALKALINITY	6	6	0	7	7	0	13	13	0	13	13	0
CALCIUM	6	6	0	7	7	0	13	13	0	12	12	0
CYANIDE	6	0	0	7	0	0	.	.	.	.	.	.
CHLORIDE	6	6	0	7	7	0	13	13	0	12	12	0
COLOUR	6	0	5	7	0	4	13	0	9	13	0	7
CONDUCTIVITY	6	6	0	7	7	0	13	13	0	13	13	0
DISS ORG CARBON	6	6	0	7	7	0	13	13	0	13	13	0
FLUORIDE	6	6	0	7	7	0	13	13	0	13	13	0
HARDNESS	6	6	0	7	7	0	13	13	0	12	12	0
IONCAL	6	6	0	7	7	0	13	13	0	13	12	0
LANGELIERS INDEX	6	6	0	5	5	0	11	11	0	12	12	0
MAGNESIUM	6	6	0	7	7	0	13	13	0	12	12	0
SODIUM	6	6	0	7	7	0	13	13	0	12	12	0
AMMONIUM TOTAL	6	2	3	7	0	2	13	2	6	11	0	9
NITRITE	6	4	2	7	1	2	13	1	5	11	1	3
TOTAL NITRATES	6	6	0	7	7	0	13	13	0	12	12	0
NITROGEN TOT KJELD	6	6	0	7	6	1	13	10	3	13	10	3
PH	6	6	0	7	7	0	13	13	0	13	13	0
PHOSPHORUS FIL REACT	6	5	1	7	1	2	.	.	.	.	.	.
PHOSPHORUS TOTAL	6	5	1	7	0	6	.	.	.	.	.	.
SULPHATE	6	6	0	7	7	0	13	13	0	12	12	0
TURBIDITY	6	5	1	7	7	0	13	12	1	13	10	3
*TOTAL SCAN CHEMISTRY (LAB)	132	111	13	152	111	17	245	205	24	235	194	25

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE RAW INTAKE TOTAL	POSITIVE	TRACE	TREATED TOTAL	POSITIVE	TRACE	SITE 1 TOTAL	POSITIVE	TRACE	SITE2 TOTAL	POSITIVE	TRACE
METALS												
SILVER	6	0	0	7	0	0	13	0	0	13	0	1
ALUMINUM	6	6	0	7	7	0	13	13	0	13	13	0
ARSENIC	6	1	5	7	0	4	13	0	6	13	0	8
BARIUM	6	6	0	7	7	0	13	13	0	13	13	0
BORON	6	3	3	7	6	1	13	12	1	13	11	2
BERYLLIUM	6	0	0	7	0	0	13	0	1	13	0	3
CADMIUM	6	0	0	7	0	0	13	0	2	13	0	0
COBALT	6	0	6	7	0	7	13	0	13	13	0	12
CHROMIUM	6	1	4	7	0	6	13	0	11	13	0	11
COPPER	6	6	0	7	0	7	13	5	8	13	6	7
IRON	6	5	1	7	0	1	13	0	1	13	0	3
MERCURY	6	0	0	7	0	0	.	.	.	.	.	.
MANGANESE	6	6	0	7	7	0	13	7	6	13	8	5
MOLYBDENUM	6	2	4	7	7	0	13	13	0	13	13	0
NICKEL	6	0	6	7	0	5	13	5	3	13	0	7
LEAD	6	5	1	7	0	4	13	5	7	13	6	6
ANTIMONY	6	0	6	7	1	6	13	3	10	13	1	12
SELENIUM	6	0	1	7	0	3	13	0	4	13	0	6
STRONTIUM	6	6	0	7	7	0	13	13	0	13	13	0
TITANIUM	6	1	5	7	0	7	13	0	13	13	0	13
THALLIUM	6	0	0	7	0	0	13	0	0	13	0	0
URANIUM	6	1	5	7	0	6	13	0	9	13	0	10
VANADIUM	6	4	2	7	7	0	13	13	0	13	12	1
ZINC	6	6	0	7	4	3	13	9	4	13	7	6
*TOTAL SCAN METALS	144	59	49	168	53	60	299	111	99	299	103	113
*TOTAL GROUP INORGANIC & PHYSICAL	294	188	62	356	200	77	622	394	123	599	362	138
CHLOROAROMATICS												
HEXACHLOROBUTADIENE	6	0	0	7	0	0	6	0	0	6	0	0
123 TRICHLOROBENZENE	6	0	0	7	0	0	6	0	0	6	0	0
1234 T-CHLOROBENZENE	6	0	0	7	0	0	6	0	0	6	0	0
1235 T-CHLOROBENZENE	6	0	0	7	0	0	6	0	0	6	0	0
124 TRICHLOROBENZENE	6	0	0	7	0	0	6	0	0	6	0	0
1245 T-CHLOROBENZENE	6	0	0	7	0	0	6	0	0	6	0	0
135 TRICHLOROBENZENE	6	0	0	7	0	0	6	0	0	6	0	0
HCB	6	0	0	7	0	0	6	0	0	6	0	0
HEXACHLOROETHANE	6	0	0	7	0	1	6	0	1	6	0	1
OCTACHLOROSTYRENE	6	0	0	7	0	0	6	0	0	6	0	0
PENTACHLOROBENZENE	6	0	0	7	0	0	6	0	0	6	0	0
236 TRICHLOROTOLUENE	6	0	0	7	0	0	6	0	0	6	0	0
245 TRICHLOROTOLUENE	6	0	0	7	0	0	6	0	0	6	0	0
26A TRICHLOROTOLUENE	6	0	0	7	0	0	6	0	0	6	0	0
*TOTAL SCAN CHLOROAROMATICS	84	0	0	98	0	1	84	0	1	84	0	1
CHLOROPHENOLS												

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE RAW INTAKE TOTAL	POSITIVE	TRACE	TREATED TOTAL	POSITIVE	TRACE	SITE 1 TOTAL	POSITIVE	TRACE	SITE2 TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	1	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	1	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	1	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	1	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	1	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	1	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	6	0	0	12	0	0	0	0	0	0	0	0
PAH												
PHENANTHRENE	6	0	1	7	0	0	2	0	0	2	0	0
ANTHRACENE	6	0	0	7	0	0	2	0	0	2	0	0
FLUORANTHENE	6	0	0	7	0	0	2	0	0	2	0	0
PYRENE	6	0	0	7	0	0	2	0	0	2	0	0
BENZO(A)ANTHRACENE	6	0	0	7	0	0	2	0	0	2	0	0
CHRYSENE	6	0	0	7	0	0	2	0	0	2	0	0
DIMETH. BENZ(A)ANTHR	6	0	0	7	0	0	2	0	0	2	0	0
BENZO(E) PYRENE	6	0	0	7	0	0	2	0	0	2	0	0
BENZO(B) FLUORANTHEN	6	0	0	7	0	0	2	0	0	2	0	0
PERYLENE	6	0	0	7	0	0	2	0	0	2	0	0
BENZO(K) FLUORANTHEN	6	0	1	7	0	0	2	0	0	2	0	0
BENZO(A) PYRENE	6	0	1	7	0	0	2	0	0	2	0	0
BENZO(G,H,I) PERYLEN	6	0	0	7	0	0	2	0	0	2	0	0
DIBENZO(A,H) ANTHRAC	6	0	0	7	0	0	2	0	0	2	0	0
INDENO(1,2,3-C,D) PY	6	0	0	7	0	0	2	0	0	2	0	0
BENZO(B) CHRYSENE	6	0	1	7	0	0	2	0	0	2	0	0
CORONENE	6	0	0	7	0	0	2	0	0	2	0	0
*TOTAL SCAN PAH	102	0	4	119	0	0	34	0	0	34	0	0
PESTICIDES & PCB												
ALDRIN	6	0	0	7	0	0	6	0	0	6	0	0
ALPHA BHC	6	0	2	7	0	0	6	0	0	6	0	0
BETA BHC	6	0	0	7	0	0	6	0	0	6	0	0
LINDANE	6	0	0	7	0	0	6	0	0	6	0	0
ALPHA CHLORDANE	6	0	0	7	0	0	6	0	0	6	0	0
GAMMA CHLORDANE	6	0	0	7	0	0	6	0	0	6	0	0
DIELDRIN	6	0	0	7	0	0	6	0	0	6	0	0
METHOXYCHLOR	6	0	0	7	0	0	6	0	0	6	0	0
ENDOSULFAN 1	6	0	0	7	0	0	6	0	0	6	0	0
ENDOSULFAN II	6	0	0	7	0	0	6	0	0	6	0	0
ENDRIN	6	0	0	7	0	0	6	0	0	6	0	0
ENDOSULFAN SULPHATE	6	0	0	7	0	0	6	0	0	6	0	0
HEPTACHLOR EPOXIDE	6	0	0	7	0	0	6	0	0	6	0	0
HEPTACHLOR	6	0	0	7	0	0	6	0	0	6	0	0
MIREX	6	0	0	7	0	0	6	0	0	6	0	0
OXYCHLORDANE	6	0	0	7	0	0	6	0	0	6	0	0
OPDDT	6	0	0	7	0	0	6	0	0	6	0	0
PCB	6	0	0	7	0	0	6	0	0	6	0	0
DDD	6	0	0	7	0	0	6	0	0	6	0	0
PPDDE	6	0	0	7	0	0	6	0	0	6	0	0

TABLE 4
ORINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE RAW INTAKE TOTAL	POSITIVE	TRACE	TREATED TOTAL	POSITIVE	TRACE	SITE 1 TOTAL	POSITIVE	TRACE	SITE2 TOTAL	POSITIVE	TRACE
PPODT	6	0	0	7	0	0	6	0	0	6	0	0
AMETRINE	6	0	0	7	0	0	.	.	.	.	.	.
ATRAZINE	6	0	1	7	0	0	.	.	.	.	.	.
ATRATONE	6	0	0	7	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	6	0	0	7	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	6	0	0	7	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	5	0	0	6	0	0	.	.	.	.	.	.
PROMETONE	6	0	0	7	0	0	.	.	.	.	.	.
PROPAZINE	6	0	0	7	0	0	.	.	.	.	.	.
PROMETRYNE	6	0	0	7	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	5	0	0	6	0	0	.	.	.	.	.	.
SIMAZINE	6	0	0	7	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	6	0	0	7	0	0	.	.	.	.	.	.
METOLACHLOR	6	0	0	7	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	3	0	0	3	0	0	2	0	0	2	0	0
*TOTAL SCAN PESTICIDES & PCB	205	0	3	239	0	0	128	0	0	128	0	0
PHENOLICS												
PHENOLICS	6	1	1	7	1	0	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	6	1	1	7	1	0	0	0	0	0	0	0
SPECIFIC PESTICIDES												
TOXAPHENE	6	0	0	7	0	0	6	0	0	6	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	1	0	0	2	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	1	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	1	0	0	1	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	1	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	1	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	1	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	1	0	0	2	0	0	.	.	.	.	.	.
ETHION	1	0	0	2	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	1	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	1	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	1	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	1	0	0	2	0	0	.	.	.	.	.	.
PARATHION	1	0	0	2	0	0	.	.	.	.	.	.
PHORATE	1	0	0	1	0	0	.	.	.	.	.	.
RELDAN	1	0	0	2	0	0	.	.	.	.	.	.
RONNEL	1	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	1	0	0	2	0	0	.	.	.	.	.	.
CICP	1	0	0	2	0	0	.	.	.	.	.	.
DIALLATE	1	0	0	2	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	SITE RAW INTAKE TOTAL	POSITIVE	TRACE	TREATED TOTAL	POSITIVE	TRACE	SITE 1 TOTAL	POSITIVE	TRACE	SITE2 TOTAL	POSITIVE	TRACE
EPTAM	1	0	0	2	0	0	.	.	.	.	.	.
IPC	1	0	0	2	0	0	.	.	.	.	.	.
PROPOXUR	1	0	0	2	0	0	.	.	.	.	.	.
CARBARYL	1	0	0	2	0	0	.	.	.	.	.	.
BUTYLATE	1	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	32	0	0	57	0	0	6	0	0	6	0	0
VOLATILES												
BENZENE	6	0	0	7	0	0	7	0	0	7	0	0
TOLUENE	6	0	0	7	0	0	7	0	0	7	0	0
ETHYLBENZENE	6	0	1	7	0	1	7	0	1	7	0	1
P-XYLENE	6	0	0	7	0	0	7	0	0	7	0	0
M-XYLENE	6	0	0	7	0	0	7	0	3	7	0	0
O-XYLENE	6	0	0	7	0	0	7	0	3	7	0	0
STYRENE	6	0	2	7	0	0	7	0	0	7	0	0
1,1 DICHLOROETHYLENE	6	0	0	7	0	0	7	0	0	7	0	0
METHYLENE CHLORIDE	6	0	0	7	0	0	7	0	0	7	0	0
T1,2DICHLOROETHYLENE	6	0	0	7	0	0	7	0	0	7	0	0
1,1 DICHLOROETHANE	6	0	0	7	0	0	7	0	0	7	0	0
CHLOROFORM	6	0	1	7	7	0	7	7	0	7	7	0
111, TRICHLOROETHANE	6	0	1	7	0	0	7	0	0	7	0	0
1,2 DICHLOROETHANE	6	0	0	7	0	0	7	0	0	7	0	0
CARBON TETRACHLORIDE	6	0	0	7	0	0	7	0	0	7	0	0
1,2 DICHLOROPROPANE	6	0	0	7	0	0	7	0	0	7	0	0
TRICHLOROETHYLENE	6	0	0	7	0	0	7	0	0	7	0	0
DICHLOROBROMOMETHANE	6	0	0	7	7	0	7	7	0	7	7	0
112 TRICHLOROETHANE	6	0	0	7	0	0	7	0	0	7	0	0
CHLORODIBROMOMETHANE	6	0	0	7	7	0	7	7	0	7	7	0
T-CHLOROETHYLENE	6	0	0	7	0	0	7	0	0	7	0	0
BROMOFORM	6	0	0	7	0	7	7	0	7	7	0	7
1122 T-CHLOROETHANE	6	0	0	7	0	0	7	0	0	7	0	0
CHLOROBENZENE	6	0	0	7	0	0	7	0	0	7	0	0
1,4 DICHLOROBENZENE	6	0	0	7	0	0	7	0	0	7	0	0
1,3 DICHLOROBENZENE	6	0	0	7	0	0	7	0	0	7	0	0
1,2 DICHLOROBENZENE	6	0	0	7	0	0	7	0	0	7	0	0
ETHLYENE DIBROMIDE	6	0	0	7	0	0	7	0	0	7	0	0
TOTL TRIHALOMETHANES	6	0	0	7	7	0	7	7	0	7	7	0
*TOTAL SCAN VOLATILES	174	0	5	203	28	8	203	28	14	203	28	8
*TOTAL GROUP ORGANIC	609	1	13	735	29	9	455	28	15	455	28	9

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR		Unreliable: Could Not Confirm By Reanalysis
UCS		Unreliable: Contamination Suspected
UIN		Unreliable: Indeterminate Interference
XP		Positive After X Number Of Hours
T#	(T06)	Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)		**DET'N LIMIT = 0**	**GUIDELINE = 0 (A1)**			
JUN	.	.	.	.	.	.
SEP	56	.	.	.	.	.
OCT	24	.	.	.	.	.
NOV	16	.	.	.	.	.
DEC	16	.	.	.	.	.
STANDRD PLATE CNT MF (COUNTS/ML)		**DET'N LIMIT = 0**	**GUIDELINE = 500/ML (A3)**			
JUN	.	0 <=>	.	0 <=>	.	0 <=>
JUL	.	.	.	6 <=>	.	1 <=>
AUG	.	0 <=>	.	0 <=>	.	0 <=>
SEP	.	2 <=>	.	2 <=>	.	0 <=>
OCT	.	1 <=>	.	9 <=>	.	3 <=>
NOV	.	0 <=>	.	0 <=>	.	0 <=>
DEC	.	1 <=>	.	0 <=>	.	0 <=>
TOTAL COLIFORM MF (CT/100ML)		**DET'N LIMIT = 0**	**GUIDELINE = 5/100ML(A1)**			
JUN	.	.	.	.	.	.
SEP	180	.	.	.	.	.
OCT	200	.	.	.	.	.
NOV	1300	.	.	.	.	.
DEC	120 <=>	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		**DET'N LIMIT = 0**	**GUIDELINE = N/A**			
JUN	.	.	.	.	.	.
SEP	24000 >	.	.	.	.	.
OCT	6400	.	.	.	.	.
NOV	6500	.	.	.	.	.
DEC	3800	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
JUN	.	.080	.	.100	.	.200
JUL	.	.090	.200	.200	.200	.100
AUG	.	.	.070	.060	.100	.100
SEP	.	.100	.050	.070	.100	.100
OCT	.	.540	.040	.080	.100	.100
NOV	.	.100	.050	.070	.080	.180
DEC	.	.180	.070	.110	.250	.280
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
JUN	.	.510	.	.500	.	.500
JUL	.	.660	.100	.300	.600	.650
AUG	.	.	.110	.300	.500	.500
SEP	.	.520	.230	.420	.200	.600
OCT	.	.480	.080	.270	.200	.100
NOV	.	.500	.280	.380	.250	.220
DEC	.	.410	.230	.410	.350	.370
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
JUN	.	.590	.	.600	.	.700
JUL	.	.750	.300	.500	.800	.750
AUG	.	.	.180	.360	.600	.600
SEP	.	.620	.280	.490	.300	.700
OCT	.	1.020	.120	.350	.300	.200
NOV	.	.600	.340	.450	.330	.400
DEC	.	.590	.300	.520	.600	.650
FLD PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
JUN	7.700	7.100	.	7.400	.	7.500
JUL	7.600	7.000	7.600	7.600	7.500	7.500
AUG	7.600	.	7.100	7.200	7.700	7.800
SEP	7.900	7.200	7.370	7.020	7.900	7.900
OCT	7.800	7.200	7.670	7.600	7.800	7.700
NOV	8.000	7.310	7.850	7.800	7.600	7.700
DEC	7.900	7.100	7.200	7.270	7.500	7.700
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)		
JUN	19.400	20.400	.	18.500	.	17.000
JUL	21.300	22.000	20.000	21.000	18.500	19.000
AUG	22.800	.	20.500	20.800	20.000	19.000
SEP	15.400	17.500	19.000	20.000	18.500	18.000
OCT	12.500	13.000	17.500	16.000	17.000	16.000
NOV	6.100	7.300	13.000	11.000	16.500	14.700
DEC	3.700	5.400	13.000	8.000	11.100	10.500
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)		
JUN	12.000	.150	.	.300	.	.
JUL	1.100	.140	.150	.190	.	.
AUG	1.500	.	.120	.140	.	.
SEP	38.000	.130	.230	.170	.	.
OCT	24.000	.130	.210	.180	.	.
NOV	15.000	.100	.230	.180	.	.
DEC	7.000	.100	.170	.170	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
	CHEMISTRY (LAB)					
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)		
JUN	89.200	80.200	.	83.400	.	84.200
JUL	89.000	78.500	80.600	79.800	84.600	85.200
AUG	85.500	77.600	77.900	77.900	82.000	82.200
SEP	86.000	77.100	74.800	75.600	79.500	79.300
OCT	89.000	86.100	85.500	86.400	89.600	90.200
NOV	100.400	93.200	92.100	92.600	88.200	88.100
DEC	103.700	88.500	82.700	84.200	90.700	90.500
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)		
JUN	34.000	37.200	.	35.500	.	35.400
JUL	35.300	34.500	34.900	34.700	37.200	37.500
AUG	31.600	31.600	32.200	31.900	35.900	34.800
SEP	34.400	34.000	33.200	33.200	37.200	37.400
OCT	34.700	37.400	36.500	37.600	41.900	43.400
NOV	44.000	45.000	44.700	45.600	42.500	42.700
DEC	48.400	41.400	39.400	39.400	44.200	!!S
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)		
JUN	21.000	26.300	.	19.200	.	19.000
JUL	17.900	18.600	18.100	18.900	14.900	14.400
AUG	6.900	12.300	12.400	12.800	12.400	12.400
SEP	22.000	17.100	13.700	13.700	13.500	13.600
OCT	6.300	21.200	23.700	20.800	23.500	24.600
NOV	32.700	30.200	31.200	31.700	22.200	22.000
DEC	39.800	32.700	26.700	26.900	24.700	!!S
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)		
JUN	BDL	.500 <T	.	BDL	.	.500 <T
JUL	1.500 <T	BDL	BDL	.500 <T	.500 <T	BDL
AUG	2.000 <T	.500 <T	BDL	.500 <T	.500 <T	.500 <T
SEP	1.500 <T	.500 <T	.500 <T	.500 <T	BDL	BDL
OCT	.500 <T	BDL	.500 <T	.500 <T	.500 <T	BDL
NOV	1.500 <T	.500 <T	.500 <T	.500 <T	.500 <T	.500 <T
DEC	BDL	BDL	.500 <T	BDL	BDL	BDL
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)		
JUN	279	310	.	287	.	290
JUL	276	277	279	280	275	275
AUG	239	252	252	253	258	259
SEP	282	269	251	253	258	258
OCT	269	304	309	302	317	322
NOV	351	351	348	349	309	309
DEC	377	353	320	322	329	329
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)		
JUN	1.700	1.300	.	1.100	.	1.100
JUL	1.800	1.000	1.000	.900	.900	.900
AUG	1.800	.900	.900	.800	.900	.900
SEP	1.900	1.000	1.000	1.000	1.000	.900
OCT	2.000	1.300	1.300	1.200	1.800	1.200
NOV	2.100	1.400	1.300	1.100	1.000	1.000
DEC	2.200	1.300	1.400	1.100	1.100	1.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)		
JUN	.100	.080	.	.080	.	.080
JUL	.100	.080	.100	.080	.080	.080
AUG	.100	.080	.080	.080	.100	.080
SEP	.140	.100	.100	.100	.100	.100
OCT	.100	.080	.080	.080	.100	.080
NOV	.100	.100	.080	.100	.080	.080
DEC	.100	.080	.080	.080	.080	.060
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)		
JUN	118.900	125.500	.	121.200	.	119.400
JUL	122.200	120.400	120.700	120.300	123.400	123.100
AUG	111.000	109.200	110.400	110.300	116.000	112.900
SEP	120.000	117.000	113.000	113.000	118.000	118.000
OCT	121.200	127.200	124.600	126.800	133.100	137.300
NOV	146.800	149.400	148.200	150.800	134.800	135.600
DEC	161.000	143.000	132.000	132.000	141.000	!!S
IONCAL (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
JUN	.350	.039	.	.077	.	1.908
JUL	4.540	2.130	2.055	.644	2.480	2.380
AUG	5.960	.417	.020	.183	1.587	.874
SEP	2.532	2.823	3.464	2.980	3.894	3.812
OCT	2.858	1.214	2.392	.129	.692	1.446
NOV	3.278	4.260	4.000	4.768	5.105	5.493
DEC	3.806	2.879	.445	.691	.498	.000
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
JUN	.311	.292	.	.207	.	.309
JUL	.177	.133	.158	.221	.299	.315
AUG	.266	-.011	.019	.005	.266	.253
SEP	.239	.072	.125	.099	.258	.309
OCT	.273	.127	.082	.092	.272	.329
NOV	.379	.146	.299	.309	.222	.253
DEC	.442	-.073	-.080	-.063	.199	.
MAGNESIUM (MG/L)			DET'N LIMIT = 0.10	GUIDELINE = 30 (F2)		
JUN	8.250	7.900	.	7.950	.	7.550
JUL	8.300	8.300	8.150	8.150	7.450	7.200
AUG	7.800	7.400	7.250	7.450	6.400	6.350
SEP	8.200	7.700	7.300	7.400	6.200	6.000
OCT	8.400	8.250	8.150	8.050	6.900	7.000
NOV	8.950	9.000	8.900	8.950	6.950	7.050
DEC	9.700	8.700	8.100	8.300	7.300	!!S
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)		
JUN	9.700	11.300	.	8.900	.	8.700
JUL	8.900	8.600	8.300	8.500	7.300	7.000
AUG	6.100	6.600	6.200	6.400	6.400	6.400
SEP	10.400	8.200	6.400	6.400	6.200	6.400
OCT	7.200	8.500	10.200	9.200	9.200	9.800
NOV	14.100	12.500	12.900	13.000	10.700	10.300
DEC	16.000	13.000	10.200	10.800	10.000	!!S

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
JUN	.064	BDL	.	BDL	.	BDL
JUL	.004 <T	BDL	.006 <T	.002 <T	.002 <T	.004 <T
AUG	.018	.004 <T	.004 <T	.002 <T	.004 <T	.004 <T
SEP	.006 <T	BDL	BDL	BDL	.006 <T	.002 <T
OCT	BDL	BDL	.012	BDL	.004 <T	.004 <T
NOV	.008 <T	.002 <T	.004 <T	.002 <T	.004 <T	BDL
DEC	.034	BDL	.052	BDL	.	IIS
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
JUN	.012	.005	.	.005	.	.006
JUL	.005	BDL	.001 <T	BDL	BDL	BDL
AUG	.003 <T	BDL	BDL	BDL	BDL	BDL
SEP	.004 <T	BDL	BDL	BDL	.002 <T	BDL
OCT	.011	.001 <T	.001 <T	BDL	.001 <T	BDL
NOV	.008	.002 <T	.003 <T	.001 <T	.001 <T	BDL
DEC	.011	BDL	.001 <T	BDL	.	IIS
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)		
JUN	.555	.570	.	.515	.	.520
JUL	.475	.490	.490	.510	.460	.460
AUG	.310	.295	.295	.295	.290	.295
SEP	.420	.355	.285	.295	.295	.290
OCT	.530	.560	.530	.555	.495	.520
NOV	.990	.930	.685	.920	.520	.510
DEC	1.240	.900	.660	.660	.720	IIS
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
JUN	.280	.110	.	.110	.	.110
JUL	.220	.100	.210	.180	.100	.130
AUG	.170	.060 <T	.040 <T	.070 <T	.030 <T	.050 <T
SEP	.380	.110	.120	.090 <T	.100	.090 <T
OCT	.340	.120	.200	.130	.120	.120
NOV	.330	.160	.210	.130	.140	.110
DEC	.340	.180	.260	.140	.140	.140
PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
JUN	8.260	8.260	.	8.170	.	8.270
JUL	8.110	8.130	8.140	8.210	8.230	8.240
AUG	8.250	8.020	8.040	8.030	8.220	8.220
SEP	8.200	8.080	8.150	8.120	8.210	8.260
OCT	8.210	8.060	8.030	8.020	8.140	8.180
NOV	8.180	7.970	8.130	8.130	8.090	8.120
DEC	8.190	7.810	7.850	7.860	8.040	8.220
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005	GUIDELINE = N/A		
JUN	.006	.003	.	.	.	.
JUL	.000 <T	BDL	.	.	.	.
AUG	.003	.001 <T	.	.	.	.
SEP	.007	.000 <T	.	.	.	.
OCT	.013	BDL	.	.	.	.
NOV	.004	BDL	.	.	.	.
DEC	.013	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = .40 (F2)		
JUN	.037	.002 <T	.	.	.	.
JUL	.009 <T	.004 <T	.	.	.	.
AUG	.012	BDL	.	.	.	.
SEP	.038	.002 <T	.	.	.	.
OCT	.058	.002 <T	.	.	.	.
NOV	.028	.002 <T	.	.	.	.
DEC	.024	.005 <T	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200	GUIDELINE = 500 (A3)		
JUN	19.000	29.400	.	27.310	.	26.970
JUL	18.750	28.390	26.910	28.270	27.580	26.940
AUG	20.100	26.090	26.190	25.890	26.200	26.170
SEP	19.370	27.070	26.320	26.460	26.210	26.460
OCT	18.360	28.370	28.380	28.280	28.350	28.250
NOV	20.780	29.020	29.000	28.970	27.760	27.650
DEC	23.220	33.040	30.750	31.280	33.420	!!S
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)		
JUN	23.000	.370	.	.220	.	.510
JUL	1.060	.450	.320	.290	.300	.360
AUG	3.400	.330	.310	.300	.240 <T	.340
SEP	.220 <T	.420	.340	.490	.240 <T	.250
OCT	47.000	.400	.340	.230 <T	.560	.270
NOV	18.000	.420	.590	.260	.330	.320
DEC	12.700	.250	.450	.250	.220 <T	.420

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
SILVER (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A1)		
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	BDL	BDL	.180 <T	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)		
JUN	180.000	91.000	.	59.000	.	58.000
JUL	21.000	77.000	59.000	70.000	64.000	64.000
AUG	70.000	110.000	81.000	83.000	100.000	100.000
SEP	250.000	79.000	73.000	79.000	94.000	96.000
OCT	340.000	82.000	61.000	64.000	82.000	78.000
NOV	110.000	44.000	33.000	33.000	31.000	30.000
DEC	120.000	25.000	22.000	20.000	20.000	21.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)		
JUN	.450 <T	BDL	.	BDL	.	.180 <T
JUL	.600 <T	.280 <T	.200 <T	.290 <T	.290 <T	.260 <T
AUG	.960 <T	.280 <T	BDL	BDL	BDL	BDL
SEP	1.100	.290 <T	.240 <T	.300 <T	.310 <T	.300 <T
OCT	.870 <T	.300 <T	.340 <T	.230 <T	.400 <T	.380 <T
NOV	.390 <T	BDL	BDL	BDL	BDL	BDL
DEC	.390 <T	BDL	BDL	BDL	BDL	.130 <T
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)		
JUN	19.000	21.000	.	20.000	.	20.000
JUL	16.000	18.000	18.000	18.000	18.000	18.000
AUG	17.000	19.000	18.000	18.000	17.000	18.000
SEP	21.000	17.000	18.000	18.000	18.000	17.000
OCT	20.000	19.000	19.000	18.000	18.000	19.000
NOV	20.000	19.000	20.000	19.000	17.000	17.000
DEC	20.000	19.000	20.000	19.000	18.000	18.000
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)		
JUN	25.000	28.000	.	31.000	.	30.000
JUL	24.000	28.000	26.000	27.000	26.000	26.000
AUG	21.000	23.000	33.000	35.000	27.000	37.000
SEP	41.000	39.000	37.000	38.000	40.000	39.000
OCT	18.000 <T	21.000	21.000	19.000 <T	21.000	20.000 <T
NOV	18.000 <T	22.000	21.000	22.000	21.000	21.000
DEC	17.000 <T	18.000 <T	23.000	23.000	24.000	19.000 <T
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)		
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	.070 <T	BDL	.060 <T	.080 <T
SEP	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	.060 <T	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	.390 <T	BDL	BDL	BDL
DEC	BDL	BDL	.130 <T	BDL	BDL	BDL
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
JUN	.360 <T	.170 <T	.	.110 <T	.	.070 <T
JUL	.150 <T	.160 <T	.190 <T	.200 <T	.180 <T	.150 <T
AUG	.200 <T	.070 <T	.060 <T	.040 <T	BDL	.030 <T
SEP	.370 <T	.080 <T	.110 <T	.080 <T	.090 <T	.090 <T
OCT	.510 <T	.090 <T	.060 <T	.080 <T	.080 <T	.080 <T
NOV	.220 <T	.110 <T	.090 <T	.100 <T	.100 <T	.200 <T
DEC	.160 <T	.080 <T	.130 <T	.140 <T	.070 <T	.100 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
JUN	3.000 <T	2.400 <T	.	3.500 <T	.	3.000 <T
JUL	1.200 <T	1.100 <T	1.400 <T	1.300 <T	1.200 <T	1.400 <T
AUG	1.400 <T	1.100 <T	1.900 <T	1.900 <T	1.100 <T	2.100 <T
SEP	5.400	4.400 <T	4.100 <T	4.100 <T	4.600 <T	4.300 <T
OCT	2.000 <T	1.400 <T	1.100 <T	BDL	1.300 <T	.670 <T
NOV	.620 <T	BDL	BDL	.510 <T	BDL	.590 <T
DEC	BDL	.590 <T	1.600 <T	1.400 <T	1.500 <T	BDL
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)		
JUN	120.000	1.700 <T	.	2.100 <T	.	1.700 <T
JUL	72.000	1.500 <T	26.000	4.400 <T	9.300	3.400 <T
AUG	99.000	1.700 <T	3.700 <T	3.500 <T	14.000	2.500 <T
SEP	140.000	.800 <T	19.000	2.900 <T	9.400	2.000 <T
OCT	57.000	.920 <T	21.000	3.000 <T	7.400	1.800 <T
NOV	74.000	.810 <T	19.000	3.900 <T	14.000	3.100 <T
DEC	59.000	.860 <T	24.000	2.200 <T	6.100	3.500 <T
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)		
JUN	330.000	BDL	.	BDL	.	BDL
JUL	28.000 <T	BDL	BDL	BDL	BDL	BDL
AUG	120.000	14.000 <T	BDL	BDL	BDL	BDL
SEP	440.000	BDL	BDL	BDL	BDL	BDL
OCT	620.000	BDL	BDL	BDL	BDL	BDL
NOV	210.000	BDL	11.000 <T	BDL	7.800 <T	7.200 <T
DEC	210.000	BDL	BDL	BDL	BDL	6.800 <T
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)		
JUN	12.000	3.400	.	.790	.	1.600
JUL	1.700	1.700	.300 <T	.360 <T	.560	.270 <T
AUG	17.000	1.200	.340 <T	.350 <T	.370 <T	.330 <T
SEP	27.000	1.500	.330 <T	.350 <T	.320 <T	.290 <T
OCT	25.000	2.400	.630	.730	1.100	.980
NOV	7.800	2.100	.780	.780	.760	.680
DEC	5.800	2.500	1.000	1.200	1.600	1.600

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
JUN	.400 <T	.780	.	.780	.	.900
JUL	.740	.800	.770	.790	.670	.760
AUG	.620	.840	.770	.750	.770	.750
SEP	.380 <T	.880	.750	.760	.830	.780
OCT	.210 <T	.910	.900	.910	.890	.910
NOV	.500 <T	.850	.860	.920	.840	.760
DEC	.500 <T	.810	.730	.720	.740	.780
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)		
JUN	BDL	BDL	.	BDL	.	BDL
JUL	.410 <T	BDL	3.600	BDL	BDL	BDL
AUG	1.700 <T	.950 <T	BDL	BDL	BDL	BDL
SEP	1.600 <T	.560 <T	3.500	BDL	BDL	.510 <T
OCT	.800 <T	.480 <T	3.500	.420 <T	.610 <T	.350 <T
NOV	1.400 <T	1.100 <T	4.700	1.500 <T	1.100 <T	1.300 <T
DEC	.800 <T	.510 <T	3.800	.740 <T	.760 <T	.590 <T
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
JUN	1.200	.070 <T	.	BDL	.	BDL
JUL	.270 <T	.100 <T	.800	.150 <T	.670	.300 <T
AUG	.790	.150 <T	.200 <T	.160 <T	.790	.380 <T
SEP	1.800	BDL	.740	.100 <T	.870	.260 <T
OCT	1.800	.140 <T	.650	.130 <T	.690	.300 <T
NOV	.790	BDL	1.000	.150 <T	.620	.250 <T
DEC	.590	BDL	1.300	.090 <T	.560	.190 <T
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)		
JUN	.300 <T	.450 <T	.	.480 <T	.	.740
JUL	.410 <T	.470 <T	.470 <T	.440 <T	.440 <T	.410 <T
AUG	.330 <T	.400 <T	.450 <T	.550	.410 <T	.400 <T
SEP	.270 <T	.380 <T	.490 <T	.320 <T	.310 <T	.340 <T
OCT	.330 <T	.530	.570	.460 <T	.500 <T	.490 <T
NOV	.270 <T	.410 <T	.480 <T	.470 <T	.490 <T	.490 <T
DEC	.320 <T	.380 <T	.520	.460 <T	.400 <T	.450 <T
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)		
JUN	BDL	1.300 <T	.	BDL	.	1.300 <T
JUL	BDL	1.300 <T	1.100 <T	1.300 <T	BDL	1.300 <T
AUG	BDL	1.100 <T	BDL	BDL	1.400 <T	1.700 <T
SEP	1.100 <T	BDL	1.500 <T	1.700 <T	2.000 <T	1.500 <T
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL
STRONTIUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = N/A		
JUN	130.000	130.000	.	130.000	.	120.000
JUL	140.000	130.000	130.000	130.000	130.000	130.000
AUG	120.000	130.000	120.000	120.000	140.000	140.000
SEP	150.000	130.000	120.000	130.000	140.000	140.000
OCT	130.000	130.000	140.000	130.000	150.000	150.000
NOV	150.000	150.000	150.000	150.000	140.000	140.000
DEC	170.000	160.000	140.000	140.000	150.000	150.000

TABLE 5
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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A		
JUN	7.000	4.700 <T	.	4.800 <T	.	4.200 <T
JUL	3.400 <T	3.100 <T	2.800 <T	3.000 <T	3.200 <T	3.200 <T
AUG	6.000	4.200 <T	3.700 <T	3.700 <T	4.300 <T	4.600 <T
SEP	4.300 <T	2.700 <T	2.800 <T	3.000 <T	3.200 <T	3.200 <T
OCT	4.400 <T	1.900 <T	2.000 <T	2.100 <T	2.300 <T	2.400 <T
NOV	4.800 <T	2.600 <T	2.600 <T	2.600 <T	2.600 <T	2.800 <T
DEC	5.000 <T	3.000 <T	2.900 <T	2.800 <T	2.800 <T	3.100 <T
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)		
JUN	.300 <T	.090 <T	.	.060 <T	.	.100 <T
JUL	.210 <T	BDL	BDL	BDL	BDL	BDL
AUG	.560	.150 <T	BDL	.070 <T	BDL	.070 <T
SEP	.290 <T	.060 <T	.060 <T	BDL	.070 <T	.060 <T
OCT	.370 <T	.220 <T	.140 <T	.160 <T	.160 <T	.160 <T
NOV	.450 <T	.220 <T	.150 <T	.180 <T	.090 <T	.070 <T
DEC	.450 <T	.120 <T	.080 <T	.090 <T	.070 <T	.060 <T
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
JUN	.830	.840	.	.900	.	.850
JUL	.450 <T	.820	.860	.860	.860	.850
AUG	.540	.940	.960	.940	.960	1.000
SEP	1.000	.810	.860	.820	.940	.920
OCT	1.100	.900	.820	.800	.860	.840
NOV	.490 <T	.600	.600	.590	.510	.480 <T
DEC	.600	.590	.570	.620	.530	.560
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)		
JUN	8.200	2.100	.	1.300 <T	.	1.200 <T
JUL	3.400	3.700	17.000	2.500	4.400	2.000 <T
AUG	5.000	2.200	1.500 <T	1.100 <T	1.800 <T	2.300
SEP	9.100	1.800 <T	11.000	1.200 <T	1.800 <T	.550 <T
OCT	8.800	1.700 <T	11.000	2.500	2.500	1.400 <T
NOV	8.200	2.800	17.000	3.800	3.900	2.600
DEC	4.300	1.600 <T	23.000	2.200	3.300	2.300

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS						
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 1900 (D4)		
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	!LA	.	BDL
NOV	BDL	BDL	.	3.000 <T	.	3.000 <T
DEC	BDL	2.000 <T	.	BDL	.	!IS

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PAH						
PHENANTHRENE (NG/L)		DET'N LIMIT = 10.		GUIDELINE = N/A		
JUN	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	25.000 <T	BDL	.	.	.	.
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
BENZO(K) FLUORANTHEN (NG/L)		DET'N LIMIT = 1.		GUIDELINE = N/A		
JUN	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	2.000 <T	BDL	.	.	.	.
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
BENZO(A) PYRENE (NG/L)		DET'N LIMIT = 5.		GUIDELINE = 10 (A1)		
JUN	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	7.000 <T	BDL	.	.	.	.
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
BENZO(B) CHRYSENE (NG/L)		DET'N LIMIT = 2.		GUIDELINE = N/A		
JUN	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	2.000 <T	BDL	.	.	.	.
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
	PESTICIDES & PCB					
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)		
JUN	2.000 <T	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	1.000 <T	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	!LA	.	BDL
NOV	1.000 <T	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	!IS
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)		
JUN	130.000 <T	BDL	.	.	.	.
JUL	90.000 <T	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L)	PHENOLICS		DET'N LIMIT = .200	GUIDELINE = 2 (A4)		
JUN	.400 <T	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	.800 <T	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
DEC	1.000	.600	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
JUN	BDL	.100 <T	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	.050 <T
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	.050 <T	BDL	.	.050 <T	.	BDL
M-XYLENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)		
JUN	BDL	BDL	.	.100 <T	.	BDL
JUL	BDL	BDL	.	.100 <T	.	BDL
AUG	BDL	BDL	.	.100 <T	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
O-XYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)		
JUN	BDL	BDL	.	.100 <T	.	BDL
JUL	BDL	BDL	.	.200 <T	.	BDL
AUG	BDL	BDL	.	.200 <T	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	.100 <T	BDL	.	BDL	.	BDL
DEC	.150 <T	BDL	.	BDL	.	BDL
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JUN	BDL	11.800	.	13.000	.	11.100
JUL	BDL	12.100	.	15.300	.	22.600
AUG	.200 <T	11.700	.	11.200	.	14.700
SEP	BDL	9.000	.	11.100	.	14.200
OCT	BDL	11.700	.	13.600	.	16.400
NOV	BDL	10.100	.	8.400	.	12.100
DEC	BDL	8.600	.	8.200	.	12.000
111, TRICHLOROETHANE (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)		
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	.040 <T	BDL	.	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM HARROW-COLCHESTER WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW INTAKE	TREATED	SITE 1		SITE2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)		
JUN	BDL	8.300	.	7.900	.	7.700
JUL	BDL	8.000	.	8.000	.	8.250
AUG	BDL	7.350	.	7.400	.	8.900
SEP	BDL	5.950	.	7.050	.	7.600
OCT	BDL	8.800	.	9.150	.	9.300
NOV	BDL	8.550	.	7.600	.	8.900
DEC	BDL	8.050	.	7.000	.	8.250
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JUN	BDL	5.100	.	4.600	.	4.700
JUL	BDL	5.100	.	5.100	.	4.900
AUG	BDL	5.700	.	5.800	.	6.500
SEP	BDL	4.500	.	5.000	.	5.200
OCT	BDL	4.700	.	4.900	.	4.900
NOV	BDL	5.000	.	4.400	.	6.200
DEC	BDL	4.100	.	3.500	.	4.400
BROMOFORM (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)		
JUN	BDL	.400 <T	.	.400 <T	.	.600 <T
JUL	BDL	.600 <T	.	.600 <T	.	.600 <T
AUG	BDL	1.200 <T	.	1.200 <T	.	1.200 <T
SEP	BDL	.800 <T	.	.800 <T	.	.800 <T
OCT	BDL	.400 <T	.	.400 <T	.	.400 <T
NOV	BDL	.600 <T	.	.600 <T	.	.800 <T
DEC	BDL	.400 <T	.	.400 <T	.	.400 <T
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)		
JUN	BDL	25.650	.	26.000	.	24.100
JUL	BDL	25.800	.	29.000	.	36.350
AUG	BDL	25.850	.	25.600	.	31.350
SEP	BDL	20.100	.	23.950	.	27.900
OCT	BDL	25.550	.	28.100	.	31.100
NOV	BDL	24.150	.	20.900	.	28.100
DEC	BDL	21.150	.	19.100	.	25.200

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
ORINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY
All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS
Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS
Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME
Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION
This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM
Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION: **NAME:** BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF

OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled
Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)

Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)

Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.